the astrogram

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National Aeronautics and Space Administration • Ames Research Center, Moffett Field, California

Summer lecture series begins

A new theory about the formation of the solar system was one of the topics of discussion when Dr. David Black of Ames Theoretical Studies Branch began the NASA-Ames/Stanford Summer Lecture Series on Thursday, 8 p.m. in the main auditorium at Ames.

The lecture series, entitled "The Natural History of the Earth," will include ten lectures, on successive Thursday evenings, all dealing with the Earth and how it developed to its present stage.

People wishing to attend the free public series can enter Ames by using Gate 18. Signs will be posted to direct employees, guests and visitors to the Auditorium in Building 200.

The series will include such diverse topics as the formation of the solar system, earthquakes, volcanos, and the appearance of life on Earth.

Up-coming lecturers and topics at the Summer Lecture Series are:

"Evolution of Continents and Oceans," Dr. Robert S. Dietz, NOAA-AOM Labs (July 12); "Appearance of Life," Prof. Preston Cloud, UC Santa Barbara (July 19).

Future lectures, through August 30, will be announced. Ames employees are urged to attend this free summer lecture series.

Motivation-Awareness Program

The Motivation-Awareness Program was established in a new NASA Policy Directive 1700.3A by Dr. James C. Fletcher, NASA Administrator, last spring. This program is designed to provide a review of the basic principles of motivation with emphasis on: (1) management planning and organization; (2) to help prevent errors, defects and reduce costs; (3) a meaningful recognition of branches, groups and individuals demonstrating progress towards these goals.

This program is designed to assist in providing an environment conducive to increasingly higher levels of performance by Ames employees with improved safety and reduced costs.

In May John Loria, OAST Director, Safety and Operating Systems Office, Dwayne Gray and Al Chop, NASA Aerospace Awareness Directors, came to Ames to discuss the applicability of this program. Briefings were held with Organizational Directors, Division Chiefs, Branch Chiefs and Section Heads.

Dr. Mark, Ames Director, has named Dr. Lewis Hughes as the Awareness Director for Ames. Dr. Hughes would like to encourage employee feed-back concerning this program.

STOCK CAR RACER . . . Richard Petty tests a recently developed watercooled helmet in a heat chamber at Ames while co-inventer Dr. Bill Williams of Environmental Control Research checks Petty's responses.

Petty tests helmet at Ames

by Nancy Baker

Stock car driver Richard Petty of North Carolina raced in Riverside Sundy, June 17, with a new water-cooled helmet designed by Ames and Aerotherm Corporation of Mountain View.

35-year old Petty, who has won 150 races in 15 years, was at Ames on Monday, June 11, to test the helmet in an environmental chamber, with temperatures up to 120 degrees F and humidity at 70%.

Originally designed for helicopter pilots, the helmet is lined with polyurethane patches which have tiny channels of cool water circulating through them.

In previous high temperature tests at Ames, the helmet has reduced pulse rate rise by 75%, and has reduced body temperature rise and weight loss due to perspiration by half.

Saying that sweat bothers him most in a race because of the loss of energy, Petty was in the heat chamber for one hour before he began to sweat. He said he felt fine.

Keeping the head area cool has shown to be important in significantly lowering heat stress on the entire body. Presently, liquid cooled suits are being used by astronauts, made of a tubing system too bulky and heavy to build into a helmet. With a lightweight patch system, cooled helmets can finally be produced.

Ames physiologist Dr. Bill Williams of the Environmental Control Research Branch worked with Bill Elkins of Aerotherm to apply the patch to a helmet, a system most successful for those exposed to high heat stress with little actual exercise, including race car drivers as well as pilots. Petty was contacted by an Aerotherm official and agreed to test their product.

The helmet uses one half pint of liquid circulated through tubing from the base of the neck to another patch surrounding an ice-filled aluminum canister. This canister could be easily replaced in five seconds in a pit stop. Only the pump, requiring a minimal amount of current, draws energy from the car's engine.

Research is being done to apply the patch helmet concept to other high heat stress jobs, possibly including grain thrasher drivers, steel mill operators and blast furnace workers. There are also some medical applications, but the helmet is still in the experimental stage.

Meanwhile, Petty is using it is keep him cool. Without it, he said, "you can make it okay. But," he added, "you could be a little bit sharper. A lot of times that's all it takes to win."

Top attendance at lecture series

The first two lectures in a free public service series of twelve, sponsored in part by Ames, drew crowds of approximately 2,500 people at De Anza's Flint Center the evenings of June 19 and 26. The series is entitled "The Next Billion Years."

The first guest speaker was Dr. Margaret Mead. Dr. Mead discussed "Our Open Ended Future" and received a standing ovation. Dr. Allan Sandage spoke on "Cosmic Evolution: Stars, Galaxies and the Universe." His presentation met with much enthusiasm.

The next two lectures will be "Evolution of Earth's Biosphere" by Dr. J. William Schopf (July 10, 8 p.m.) and "The Population Bloom" by Dr. Roger Revelle (July 17, 8 p.m.). The same lecture will be presented one day earlier at 8 p.m. in the University of San Francisco Memorial Gymnasium for those preferring a San Francisco location.

Ames employees are again urged to attend the lectures with family and friends. And 'a word to the wise' comes from Ames Public Affairs Officer, Stan Miller; "Please try to arrive early. The first lecture attracted nearly 1,000 people who could not be accommodated." So don't tempt disappointment---arrive early to secure a seat and to enjoy some extremely fascinating presentations.

DR. HANS MARK . . . congratulates Patent Award-Winners (front row, l. to r.) Dr. Ronald F. Reinisch, Dr. Donald R. Young, Hermilo Gloria, Wayne H. Howard and Michael J. Adamson; (back row, l. to r.) Dr. John Billingham, Paul M. Sawko, James O. McClenahan, Dr. Robert W. Rosser, James R. Blackaby, John Dimeff and Dr. Kenneth W. Billman.

Patent Award Ceremony

Twenty Ames scientist innovators were honored at a Patent Award Ceremony by Dr. Hans Mark, Ames Director, on June 22 at 8 a.m. in the Committee Room of Building 200. The ceremony was unique in that each award recipient briefly explained his invention and its practical application. Questions were posed and answered. There was a wide variety of work represented among the twenty innovators.

Dr. Mark complimented and congratulated the group and stated at the conclusion of the ceremoney that, "It is this variety and quality of work that characterizes Ames."

The award-winning recipients and their inventions are:

Paul M. Sawko, SC, "Intumescent Paint Containing Nitrile Rubber" and "Polymeric Vehicles as Carriers for Sulfonic Acid Salt of Nitro-Substituted Aromatic Amines;" Dr. Robert W. Rosser, SC, "Polyimide Foam for Thermal Insulation and Fire Protection;" Dr. Ronald F. Reinisch, Hermilo R. Gloria, SSG, Dr. Ronald E. Goldsberry (no longer at Ames), and Michael J. Adamson, STS, "Ultraviolet and Thermally Stable Polymer Compositions;" Dr. John A. Parker, Salvatore Riccitiello, SC, "Flexible Fire Retardant Foam;" Dr. Kenneth W. Billman, STG, and Eugene T. Leonard, (DOT/TSC), "Alignment Apparatus Using a Laser Having a Gravitationally sensitive cavity reflector;" James O. McClenahan, SSO, "Photomultiplier Circuit Including Means for Rapidly Reducing Sensitivity thereof;" Wayne H. Howard and Dr. Donald R. Young, LRP, "Skeletal Stressing Method and Apparatus;" Dr. Alan B. Chambers, James R. Blackaby, LTC, and Dr. John Billingham, LT, "Temperature Controller for a Fluid Cooled Garmet;" John Dimeff, R, and Dean R. Harrison, RFD, "Diode Quad Transducer and Discriminator Circuit;" and Joseph M. Cambra, RKP, "Overvoltage Protection Circuit."

Speakers Bureau

This issue of "The Astrogram" begins a new column on the activities of the Ames Speakers Bureau. Appearing each issue will be a list of upcoming and recently past public appearances by Ames employees.

If you are scheduled for a public appearance and find yourself not listed, could it be that the Manager of the Speakers Bureau doesn't know about your plans? Barbara Busch is the Manager, and her extension is 6364. This list begins with mid-June appearances:

*Dr. Sanford Kellman of the Theoretical Studies Branch used the new telelecturing conference facility in the Communications Branch to address teachers attending the Weber State College, Ogden, Utah, aerospace education workshop on June 14. He discussed the teaching of astronomy.

*Michael R. Wash, Avionics Research Branch, traveled to Sacramento on June 19 to talk to 950 young men attending the California Boys State convention, sponsored by the American Legion. He discussed both the Apollo and Skylab programs.

*Several Ames employees participated in the 23rd Annual Convention of the Society of Women Engineers held in San Mateo on June 28-30. Dr. James Lawless of the Chemical Evolution Branch presented a paper entitled "Biologically important Molecules in Extraterrestrial Materials;" Dr. William Quaide, Chief of Planetary Science and Applications Branch talked on "Accomplishments in Lunar Geology;" Dr. Lawrence Colin, Assistant Division Chief of Space Science, addressed the group on "Exploration of Venus." Additional presentations were made by James Pollack, Theoretical Studies Branch, Dr. John Wolfe, Chief of Space Physics Branch, and Dr. David Colburn, Space Physics Branch.

Future Presentations:

*On July 9, Garth A. Hull, Educational Programs Officer, will discuss "NASA's Space Exploration Programs" at the High Twelve Club at The Villages, a retirement community in San Jose.

*On July 13 Benjamin Beam, Assistant Chief of Research Facilities and Instrumentation Division, will address a special "Use of the Metric System" conference of teachers at California State University, San Jose on how NASA uses the metric system.

*Lt. Col. Al Worden will talk to the Mountain View Rotary on July 17 about his experiences as Command Module Pilot on Apollo 15.

*Frank DeRosa, Contract Administration, will address a group of Sons in Retirement on July 18, with emphasis on Skylab.

EEO Complaints Process

(EDITOR'S NOTE: Second part of a two part series).

When a formal complaint of an alleged discriminatory act is filed by an employee by means of the current EEO Complaints Process, the complaint is acknowledged and forwarded to the NASA Director of EEO who initiates the following actions:

* An investigator is assigned to impartially assess the nature of the complaint. A copy of the resulting investigatory file is given to the complainant with the opportunity for informal adjustment of the problem.

* If an informal adjustment is not reached, a disposition of the case, based on the investigatory file is proposed and transmitted to the complainant. Upon receipt, the complainant has 15 calendar days to request either a hearing before the NASA Administrator or a decision by the Administrator without a hearing.

* If a hearing is desired, NASA requests the Civil Service Commission to assign a Complaints Examiner from another agency to conduct the hearing. The results of such hearings are then forwarded to the NASA Administrator or his designee for a final decision.

* The complainant has the right to appeal the Administrator's decision within 15 days of notification to the Civil Service Commission Board of Appeals or file a civil action with the U. S. District Court within 30 days of receipt. If the employee chooses to appeal to the CSC Board of Appeals, he/she still maintains the right to appeal the Board's decision within 30 days of its receipt to the U. S. District Court.

* Finally, if no action is taken regarding the formal complaint within 180 days of its initial filing, the employee may file a civil action in an appropriate U. S. District Court.

The new EEO Complaints Process clearly provides Ames' employees with a prompt, impartial means of resolving allegations of job discrimination on the basis of race, color, religion, sex, or national origin. Further information about this Complaints Process can be obtained by phoning the EEO Office at extensions 5626 or 6510. This information can also be obtained by talking with one of the following Ames EEO counselors: Nancie Bell, ext. 5968; Hermilo Gloria, ext 5534; Wayne Hadland, ext 6319; George Lee, ext 6229; Esther Levy, ext 5071; Shel Smith, ext. 6330; Lewis Turner, ext.5462.

Accident prone?

Increased care must be given to safe motor vehicle operation by everyone on the Center if accidents and injuries are to be avoided.

Speed limits (25 m.p.h. maximum on base), vehicle control signs, proper turning, recognition of pedestrian rights, and all other traffic regulations must be adhered to. Traffic citations will be issued to violators. Receipt of a second citation for a moving violation may result in revoking driving privileges at the Center.

Guard Operations personnel have been requested to enforce regulations which are desiged to help ensure safe vehicle operation at Ames.

astrogram

Room 142
Admin. Mgt. Building
Phone 965-5422

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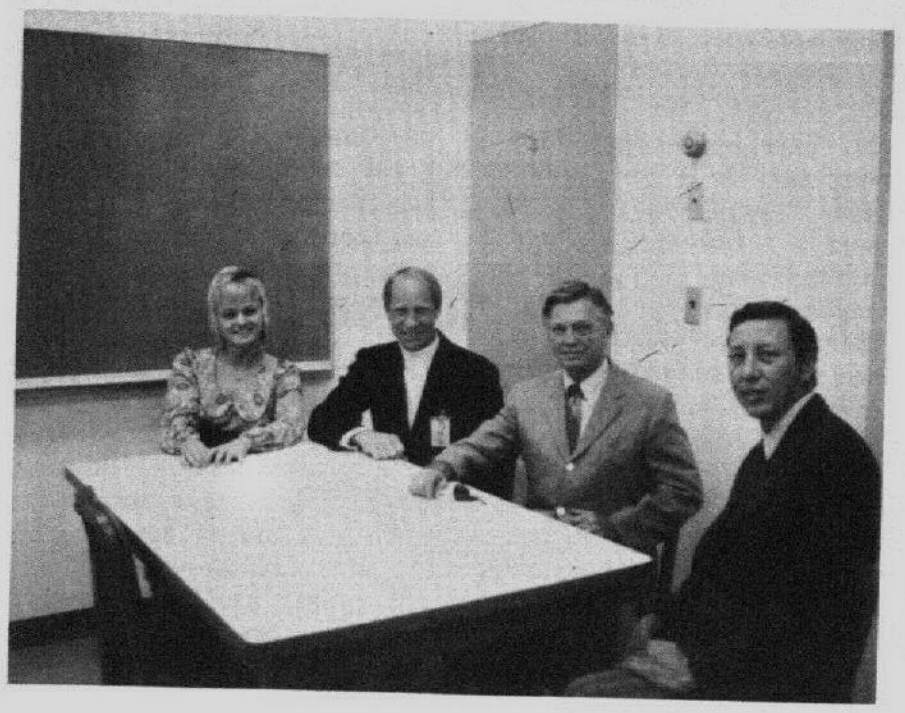
Editor . . . . . Meredith Moore
Reporters . . . . . NASA Employees

Deadline for contributions:
Thursday between publication dates

Applications Aircraft Support Programs Office



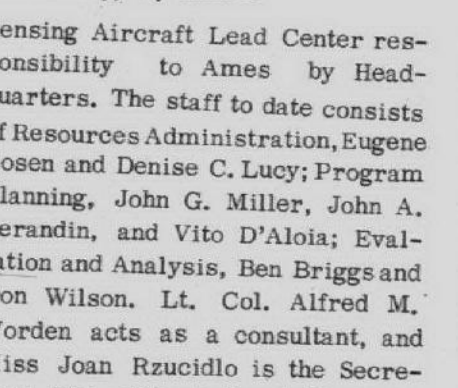
AASPO STAFF MEMBERS . . . include (l. to r.) Joan Rzucidlo, Secretary; Lt. Col. Al Worden, Consultant; Pleas E. (Bud) Greenlee, Deputy; and Edward Gomersal, Manager.

The Applications Aircraft Support Program Office (AASPO) is a NASA Headquarters office at Ames which is now six months old. The goal of AASPO is to assist the Office of Applications (OA) in the planning, integration, coordination, and review of the use of all OA aircraft resources to insure effective support of OA sponsored programs and projects.

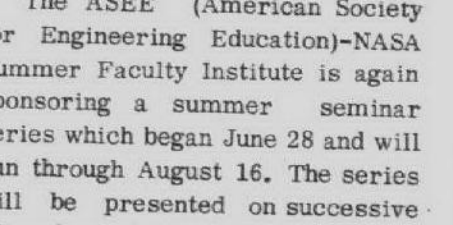
Aircraft in this program include the two Earth Resource Technology aircraft at Ames, and the WB-57F, P-3A, and C-130B aircraft at Johnson Space Center, Texas.

The Applications Aircraft Program provides for underflight support of earth observation satellites, such as the Earth Resources Technology Satellite (ERTS) and Skylab; it aids in the development of remote sensing applications such as land use technology; it evaluates new remote sensing instruments for use in aircraft and spacecraft, and it provides aerial assessment of disasters such as forest fires, earthquakes and floods.

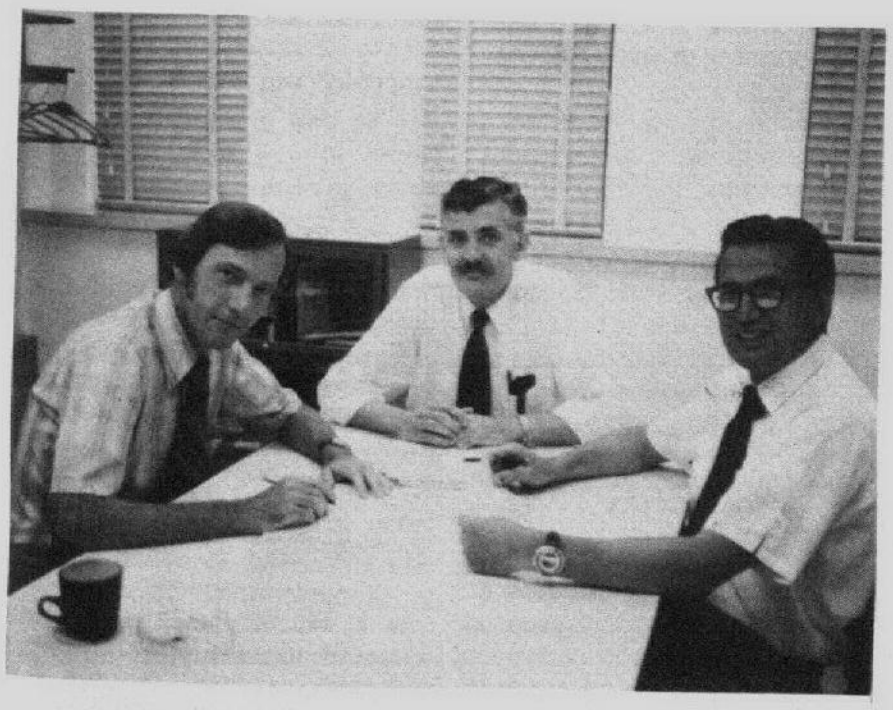
Edward W. Gomersall is the Manager, and Pleas E. (Bud) Greenlee is the Deputy. The office was established in December, 1972 following assignment of the Remote Sensing Aircraft Lead Center responsibility to Ames by Headquarters. The staff to date consists of Resources Administration, Eugene Rosen and Denise C. Lucy; Program Planning, John G. Miller, John A. Ferandin, and Vito D'Aloia; Evaluation and Analysis, Ben Briggs and Don Wilson. Lt. Col. Alfred M. Worden acts as a consultant, and Miss Joan Rzucidlo is the Secretary. The office is located in Building N240.



BEN BRIGGS and DON WILSON . . . are assigned to the Evaluation and Analysis organizational section.



DENISE LUCY and EUGENE ROSEN . . make up the Resource Administration staff of AASPO.



PROGRAM PLANNING . . . staff includes (l. to r.) John G. Miller, John A. Ferandin and Vito D'Aloia.

ASEE-Ames Seminars

The ASEE (American Society for Engineering Education)-NASA Summer Faculty Institute is again sponsoring a summer seminar series which began June 28 and will run through August 16. The series will be presented on successive Thursdays at 4:15 p.m. and can be seen on television at Ames in Building 241, room 145A or at Stanford University, Skilling Building, room 080 (Auditorium).

"The Astrogram" will announce up-coming seminar topics in future issues. The next three seminars are "Progress Towards Fusion Power" (July 5); "Power from the Wind" (July 12); and "Light Emission From Shock Waves, and Temperature Measurements" (July 19).

The seminar is open to all Ames personnel and to all members of the Stanford community.

"Thank you"

"I wish to express my deepest appreciation for the wonderful party which was arranged for me upon my retirement. I am sure that the bicycle given to me will be a source of much pleasure and should help to keep me in shape during my "Golden Years."

It was a pleasure to have worked with you. Thanks again,

Hans Bresler"

"To all my friends at Ames,

My sincere thanks for the superb retirement luncheon and the fine gifts.

I am truly privileged in having been part of Ames and treasure the friendships made.

Debby and Helen DeBevoise"

"To all the good friends of Clair and his family,

We are so grateful for friendships like yours. Painting our house was a wonderful way to show you friendship. We were so happy that he was able to see the pictures and the newspaper story.

Doris, Kent and Jerry Humpal"

Audit Office

The Headquarters Audit Office located at Ames was recently elevated to regional status and reidentified as the NASA Management Audit Office, Northwest Region.

Under the Merit Promotion Plan, Michio Nakajima has been selected as the Regional Manager. He has been the manager of the resident audit office since it was reactivated in April 1970.

The audit responsibilities of the regional office continue to focus upon the internal activities at the Center. In addition, contractor audit responsibilities have been broadened.

Toastmasters

Early Risers Toastmasters will meet in Ames Cafeteria, Wednesday July 11, to demonstrate the friendly art of toastmastering. All members of Ames staff who want to improve their listening, thinking, and speaking ability are invited to attend. As implied in their name, the meeting will open at 6:30 a.m., sharp. Contact Shel Smith, extension 6330, for further information.

Announcement

The new telephone numbers and mail stops for the Ames Cafeteria and Vending problems and compliments are:

Cafeteria . . . ext.5334,m/s 245-6

Vending ext.5523,m/s 230-2

BOWLING

The Tuesday Night Bowling League celebrated the end of its 72-73 Winter Season with an Awards Banquet at Villa Felice.

The following teams and individuals received trophies:
1st Place Division A: C. Natividad, G. Claiser, B. Rose, F. Meriwether, B. Wettlaufer; 2nd Place Division A: R. Hedlund, F. Chow, E. Farabaugh, S. Tardio and S. Sandoval; 1st Place Division B: H. Garrison, P. Polaski, L. Polaski, N. Gowan and J. Long; 2nd Place Division B: E. Magee, J. Hunter, J. Panighetti, J. Vaccaro, and D. Trask.

Individual scratch awards were won by Gary Claiser, Bernie Somer Ernie Muselman, Janet Konrath and Judy Long. Handicap awards were won by Roger Hedlund, Bill Angwin, Sandy Sandoval, Brian Wetlaufer, Jack Ratcliff, B. J. Carle, Tom Ormsby, Paul Sawko, Jim Hunter, Stan Dickinson and Jim Vaccaro.

The 73-74 season will begin next September at Futurama Bowl on Tuesdays at 6:30 p.m. Anyone interested in joining the League please contact Pauline Polaski (244-4632) or Judy Long (ext. 5926).

The following people were elected to serve as League Officers: Sal Tardio, President; Janet Konrath, Treasurer, and Pauline Polaski, Secretary.

Ames Jet Setters

Jamaica, land of water and wood, was recently visited and enjoyed by 126 Jet Setter members.

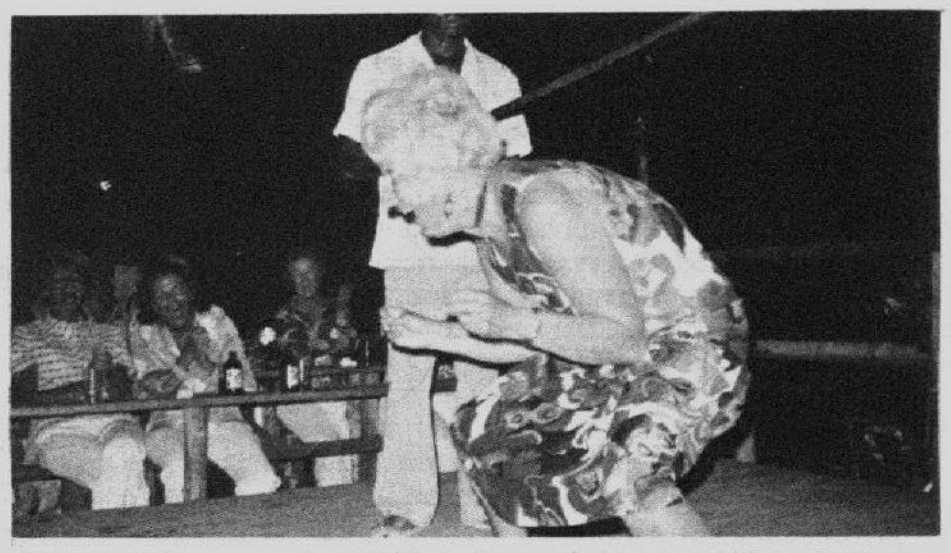
The forms of relaxation varied from Grace Webster of Avionics Research, pictured in her prize winning "native" dance pose to "nature boy," Pat Peterson, Chief of Resources Management Office.

License for bikes

All privately owned bicycles pedaled on NAS Moffett Field or ARC must be licensed. If your bicycle is not now registered within a community, you may register it with the Navy badge office, adjacent to the Main Gate.

A fee of $1 is charged. After 7/1 only licensed bicycles are permitted entry at the Center.

PAT PETERSON . . . Chief of Resources Management Office carefully examines the precious shells he collected on the beaches of Jamaica.



GRACE WEBSTER . . . of Avionics Research won a bottle of Rumona in Jamaica for her version of the "limbo."

GOLF

The course at De Laveaga was in top shape, whereas the ARC golfers were not. The giant redwoods in the first flight were toppled and balls were strewn all over the barrancas. Out of the felled timber emerged the first flight winner, Gary Lazzeroni--the new David of ARC Golf Club. Bob Eddy and John Wheatly were second, followed by a four-way tie for the 4th: Owen Koontz, Jack Lee, John Rakich, and Paul Kutler.

The 2nd flight winner was M. Orosco and in ordered sequence: K. Givens, K. Souza, J. Bull, and C. Eddy. While the 2nd flight had no problems in providing the winners, the 3rd flight resulted in a 3-way tie for first: E. Watson, B. Gray, and P. Strawbridge. By virtue of a rerun with handicapped holes, E. Watson emerged as the winner. The fourth place was garnered by S. Tardio, and, in fifth place, E. Levin.

The winners of the various flights were awarded beautiful casserole pots with the compliments of Rose Oyama. Special prizes were also awarded as was a booby prize.

WANT ADS

TRANSPORTATION

FOR SALE

65 Dodge Coronet 440, 4 dr. sedan, auto. trans. 318 V8, engine w/pep & compression, good car for $250 cash, 253-4357.

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71 MGB Roadster, like new, $2195 or trade for Super Beetle, Pinto, etc., B. McCracken, 578-2676.

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68 Olds Cutless Supreme, radio, fact. air, 350 V8, $1,000/offer; 408-438-2629, after 6 p.m.

---

65 Toyota Corona, 2 dr. HT., real sharp, $950/offer, 226-0179.

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68 Pontiac LeMans, 4 dr. HT, PB, PS, A/C, vinyl top, $700. 739-5666.

---

69 Olds, 442, 4 spd., ex. cond., low mileage, air cond., new tires, $1300. L. H. Brennwald, 408-354-7795.

HOUSING

FOR RENT

Cabin, So. Lake Tahoe, sleeps 8, avail. after 7/1. Call E.A. Harris, 948-6200.

New So. Tahoe cabin, 2 ba., sleeps 8, 5 mi. from Stateline, $50 weekend $130 wk. Sinnott 225-8043.

MISCELLANEOUS

FOR SALE

Kenmore dishwasher, 1970, green, portable which can be built in, ex. cont., $100, 997-1138 after 5 p.m.

Swimming pool, 12' x 42", filter, vacuum, hose, needs liner, $100. Vern Herren, 225-4065.

Skis (Northland Glass 300", 170cm.) and boots never used. Boot size 5 ladies, Tyrolia heel & toe bindings, 797-7411.

1970 Penncrest Zig-Zag mach. cabinet included, hardly used, $80, 732-1579 after 6 p.m.

---

2 yr. old apt. dinette, sm. drop leaf table w/2 chairs, $25, 732-1579.

GE Refrig., $50; 20 gal. fish tank complete w/ fluorescent hood, filter, gravel and fish, $20, 738-0648.

Furnace, updraft, 90000 BTU, gas, 1 yr. old, B. McCracken, 578-2676.

Boys or girls 20" bike w/ training wheels, $17, 321-1858.

Agfa camera, exc. cond; very good results, $21, 321-1858.

Tote bag, hardly used, like new; $10, 321-1858.

Matching color twin bed spreads, hardly used, both for $25, 321-1858

BOOK MISSING:
"Basic Aspect of Central Vestibular Mechanisms," A. Brodal, editor. Call Karen Hibbert, ext.5387, Life Sciences; a heavily requested book.

GOING ON VACATION?
Rent a 25 ft. motor home, reasonable rates, call 258-6422.

VISITING PROF. NEEDS HOME: Has no pets or kids, rent apt. or house, min. 3 wks., 7/16 - 8/17, water garden, care for pets, call Dr. J. Regas 244-8109.

Swimming lessons, 18 yr. old, exp. instr. qual. senior life saver, private or group lessons, call N. Haugh, 967-6850.

FREE:
My name is Casper the Cat. My owner is moving. I need a new home! Call 288-7236.

One 9 wk. old black male kitten, w/lots of personality(naturally), call M. Moore, 948-7984.

Ride desperately needed from SSF Oyster Pt. turnoff to Ames, ext.5054.

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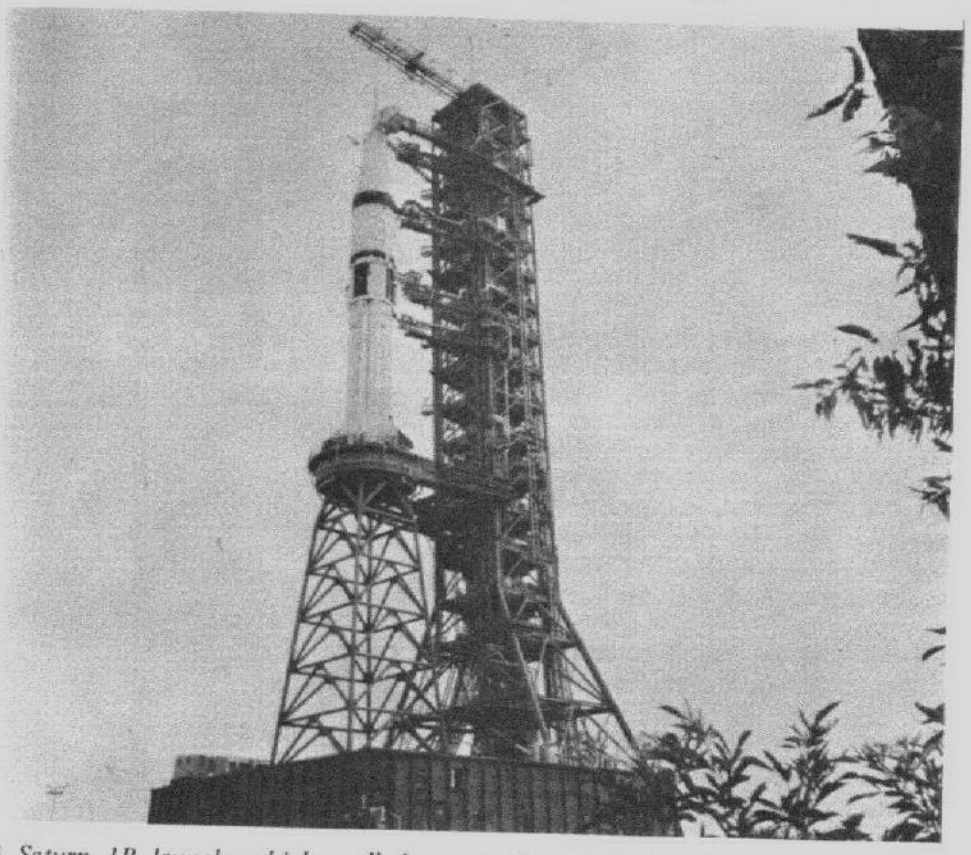
National Aeronautics and Space Administration • Ames Research Center, Moffett Field, California

Second Skylab Crew Launches July 28

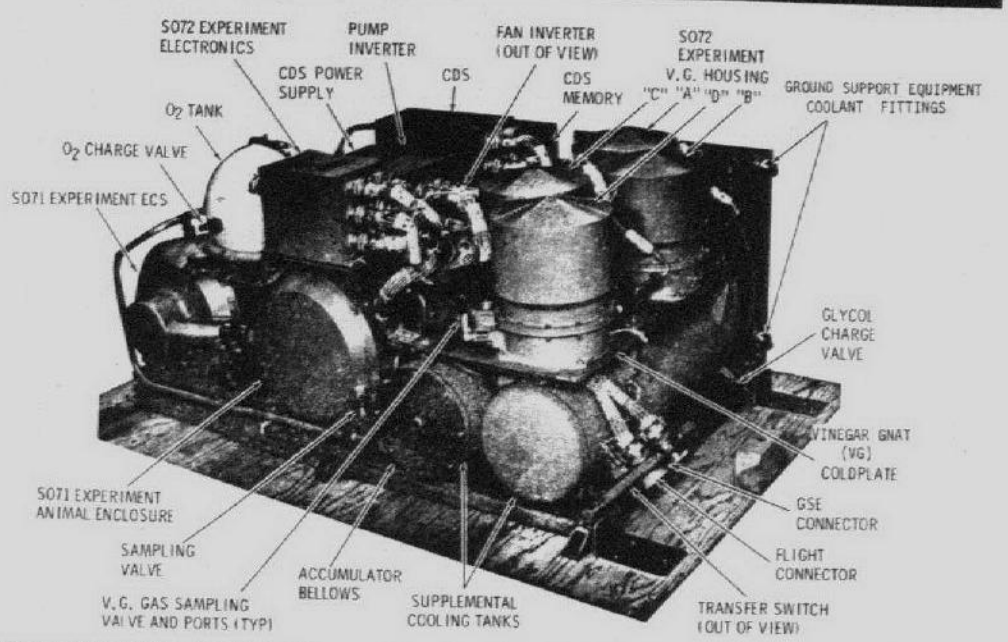


A Saturn 1B launch vehicle, rolled out to Complex 39-B, will carry the second Skylab astronaut crew to the orbital workshop on July 28.

The launching of the second crew to work and live aboard the nation's first space station, Skylab, will be no earlier than 7:08 a.m., EDT, on July 28. After conducting scientific and technical experiments for 56 days in Earth orbit, the crew is expected to splashdown in the Pacific at 8:38 p.m., EDT, Sept. 22.

The crew of the second manned visit to Skylab is headed by Alan L. Bean, commander, with Dr. Owen K. Garriott as science pilot and Jack R. Lousma as pilot. Bean, 39, is a U.S. Navy captain who walked on the Moon as the Apollo 12 lunar module pilot. Garriott, 41, is a civilian with a doctorate in electrical engineering. Lousma, 35, is a major in the U.S. Marine Corps. This will be the first space flight for Garriott and Lousma.

The crew will be boosted into orbit atop a Saturn–1B from Pad B of Launch Complex 39 at the NASA Kennedy Space Center in Florida.



EXPERIMENT PACKAGE . . . for the Circadian Rhythm Vinegar Gnat, Pocket Mouse Experiment will fly aboard Skylab SL-3 space vehicle to be launched July 28. The experiment was developed at Ames.

Ames Experiment On Board Skylab SL-3

Six pocket mice and seven hundred and twenty vinegar gnats will fly aboard the Skylab SL-3 space vehicle to be launched July 28. The mice and the gnats are part of a circadian rhythm experiment developed at Ames.

Circadian rhythm is a biological event which occurs at approximately a 24-hour pattern. These two experiments will study the stability of the circadian rhythms in space. The pocket mouse (genus Perognathus) and the vinegar gnat (genus Drosphilia) were chosen, according to Experiment Manager Gary W. Thorley of Flight Projects Branch, "because they both exhibit a rhythm which we can readily instrument for and detect.

"The pocket mouse is quite small – weighing ten grams – and doesn't drink water. He gets all his moisture from his food which consists mainly of seeds and is therefore no problem to feed."

The effect of weightlessness on the bio rhythms of the two species will be measured and compared with the species' activity or "rhythm" on Earth. In a weightless environment the subjects will not be exposed to external or geophysical forces; scientists want to find out if there will be any effect on bio rhythms during a 28-day (possibly 56 day) weightlessness period aboard Skylab. If there is an upset on the rhythms in space, scientists will need to find a means to stabilize

(Continued on page 2)

Exchange Scientist Returns From Poland

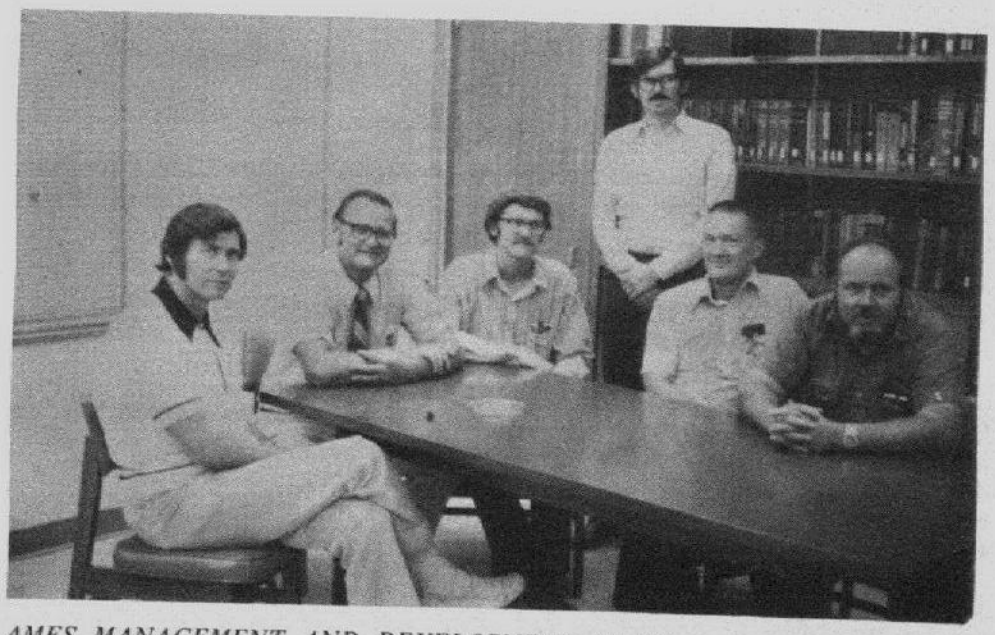
Living the life of a Polish scientist is virtually what Dr. John E. Greenleaf of Ames Human Studies Branch did for 3 months in Warsaw, Poland. Dr. Greenleaf traveled to Warsaw in March as an exchange scientist on a grant from the National Academy of Sciences in conjunction with the Polish Academy of Sciences.

The agreement between the academies is that the "home" academy provides travel expense money while the "receiving" academy pays every day room and board expenses. A tour can last anywhere from 2 weeks to 2 years in length, depending on one's preference.

Dr. Greenleaf chose to go to Warsaw because he wanted to work with a Dr. Stanislaw Kozlowski of the Laboratory of Applied Physiology, Polish Academy of Sciences. Dr. Kozlowski is doing the same type of research as Dr. Greenleaf in the field of human environmental physiology.

In a recent interview, Dr. Greenleaf stated that he and Dr. Kozlowski are "particularly interested in investigating the relationships between some of the electrolytes in the blood stream (such as sodium, calcium and potassium) and the control of body temperature regulation." Dr. Greenleaf had done work in this area at Ames utilizing humans as subjects but wanted to do more involved research which would require the use of animals.

(Continued on page 3)



AMES MANAGEMENT AND DEVELOPMENT TEAM . . . for the Circadian Rhythm Experiment include (from l. to r.): Hank Asch, PR; Dr. John W. Tremor, SA; William F. Barrows, PDF; Gary W. Thorley, PDF; Ed Park, PDF; and Ernest C. Shields, PDS.

Ames Experiment On Board Skylab SL-3

(Continued from page 1)

the rhythms during future long term space missions.

The six pocket mice are placed in six separate cages within the experiment hardware. The body temperature and the activity of each mouse is measured and stored every 10 minutes via the circadian data system. The data is transmitted by ground command about every 8 hours. Movement about the cage and body temperature are plotted versus time to observe the rhythm.

The normal body temperature of the pocket mouse is 35° to 38° C. In torpor (deep sleep) the body temperature falls to 20° C, which is the same as the ambient (surrounding) temperature. A precise period of time occurs between arousals. The time and temperature change which will take place in the weightless environment on board Skylab will be compared with that which occurred in tests on Earth.

One hundred and eighty vinegar gnats will be placed in each of four compartments in their pupae stage at a temperature of 5° C. The low temperature stops growth. The plates that the vinegar gnats are mounted on will be warmed up to 20° C after reaching the Skylab 1 in orbit to assure that the development and hatching occurs in a zero G (weightless) environment.

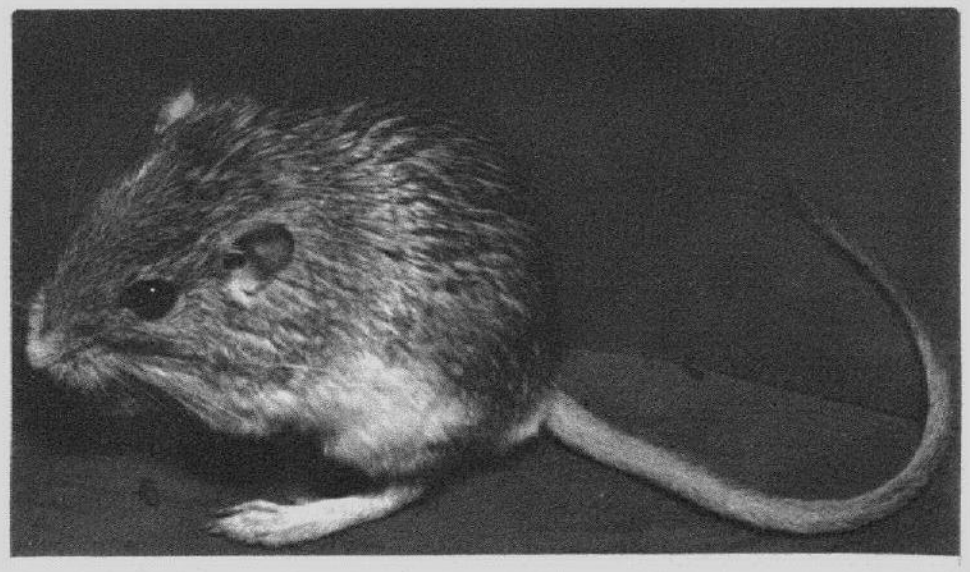
The internal experiment environments are closely controlled by the experiments' Environment Control System (ECS). The gas composition and pressure are similar to a sea level atmosphere and the temperatures are controlled to ±1/2° C.

On Earth scientists find that pupae will hatch in groups about 24 hours apart. The time period between hatchings on the Earth will be compared to the time period between hatchings aboard Skylab.

"The Vinegar Gnat Experiment (SO72)," points out Thorley, "will run less than twenty days. The Pocket Mouse Experiment (SO71) will last a minimum of 28 days with the possibility of lengthening it to 56 days. The duration depends on the status of the equipment and spacecraft."

The experiment hardware was manufactured by Northrop Electronics Division in Palos Verdes, California and measures 42" X 24" X 19" and weighs 226 pounds. Two experiment packages, according to Thorley, are at Kennedy Space Center – "one will fly and one will be used for ground control."

The Principal Investigators for the circadian rhythm study are: Dr. Robert Lindberg of Northrop Research and Technology Center in Hawthorne, California (SO71 Experiment and also Co-investigator for SO72); Dr. Colin Pittendrigh, Professor of Biology at Stanford University (SO72). Ames management and development team includes Gary W. Thorley, Experiment Manager; Ed Park, Mechanical Engineer; William F. Barrows, Electronics Engineer (all of Flight Projects Branch); Dr. John W. Tremor, Scientific Monitor from Earth Science Applications Office; Hank Asch, Reliability and Quality Assurance Office; and Ernest C. Shields, Engineering Technician, Systems Development Branch.



SIX POCKET MICE . . . like the one pictured above, will fly aboard Skylab on July 28. The pocket mice are wild and come from the desert area around Palm Springs, California.

NASA Aids EPA in Gas Turbine Car Study

NASA will assist the Environmental Protection Agency (EPA) in developing the technology needed for a low pollution automobile gas turbine engine, according to an agreement the two agencies signed today.

The agreement, signed by Roy P. Jackson, NASA's Associate Administrator for the Office of Aeronautics and Space Technology, and Robert L. Sansom, EPA's Assistant Administrator for Air and Water Programs, provides for joint participation in a 3-year Automotive Gas Turbine Technology Program. It is aimed at demonstrating a car powered by a gas turbine engine which meets or betters the 1976 Federal Emission Standards, delivers good fuel economy, and also performs well.

The gas turbine engine is one of several types of automotive power systems being explored by the EPA as an alternative to the conventional internal combustion engine. Unlike the internal-combustion engine in which combustion takes place in individual cylinders, the gas turbine engine uses a single combustion chamber and combustion is continuous. Power in a gas turbine engine is generated when hot compressed gases from the combustor drive a high speed turbine. The power is transmitted through a set of gears to the automobile transmission.

Under the agreement, NASA's Lewis Research Center in Cleveland will assist EPA's Office of Air and Water Programs – Alternative Automotive Power Systems Division, Ann Arbor, Mich. Lewis was asked to help manage the program because of its experience in related propulsion and power technologies.

Ames/Stanford Study Wildland Fires

Forest fire, the summer affliction common in western states, was the subject of the Stanford University/Ames Research Center annual summer Faculty Fellowship Program in Engineering Systems Design, this year brought together a team of federal and state foresters, aerospace researchers, and university specialists.

The interdisciplinary study, prompted by the perennial holocaust in the wildlands of the West which produce inestimable losses in property, wildlife, watershed and often in human life, defined "What Can Be Done to Reduce the Number and Size of Wildland Conflagrations?" The team included 20 university faculty members from across the country with special interest in interdisciplinary design. They were assisted by experts from the California Division of Forestry, U.S. Forest Service, Ames, Stanford University, Los Angeles City Fire Department, Stanford Research Institute, and the University of California, Berkeley.

As part of the Summer Faculty Fellowship Program sponsored by Ames and Stanford University, the study stressed a mix of disciplines such as communications, fire prevention, firefighting hardware, research in meteorology, satellite photo interpretation, safety, systems analysis, and economics.

A two-week series of public seminars began June 18 to bring together some of the leading experts in fire control and fire research.

In late August, an action program will be presented to scientists and fire protection specialists. The findings will be published and made available to interested persons later in the year.

Last year's study was to define a system to produce synthetic carbohydrate, and the 1971 study, called Project Cyclops, suggested a system for the detection of radio messages which might be beamed from intelligent civilizations elsewhere in the universe.

The study is conducted by Dr. John Billingham, Chief of Ames Biotechnology Division, and William Verplank of the Engineering Design Division at Stanford University. Clinton B. Phillips, Assistant Deputy State Forester, California Division of Forestry, and Carl N. Wilson, Assistant Director of the Pacific Southwest Range and Experiment Station of the U.S. Forest Service are acting as consultants to the study.

Pioneer 11 Beyond Mars

Pioneer 11 has crossed the orbit of Mars – only the second spacecraft to do so – on its way toward the unexplored giant planet Jupiter.

Mars' orbit is 227,815,000 kilometers (141,500,000 miles) from the Sun, compared with Earth's 149,730,000 kilometers (93 million miles) from the Sun.

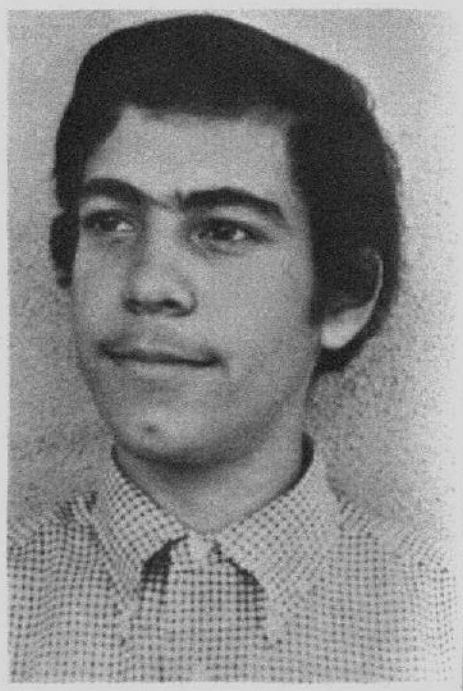
Pioneer 11's twin, Pioneer 10, made the first crossing of Mars' orbit last year on its way also to Jupiter and eventual escape from the solar system.

Since then, Pioneer 10 also has safely crossed the rocky Asteroid Belt between the orbits of Mars and Jupiter. Jupiter now lies 172,000,000 kilometers (107,000,000 miles) out ahead of Pioneer 10.

Seen from Pioneer 10, Jupiter is now the brightest object in the sky except the Sun. Pioneer 10, in flying by Jupiter this December, will view the planet and will return a variety of other data describing the planet.

Pioneer 11, launched last April, will reach Jupiter in December of next year.

All systems on both spacecraft continue to function well.



Gregory D. Dolkas, a Senior at the Palo Alto High School, has been awarded, for the third consecutive year, the Certificate of Excellence in Science. Greg is the son of Dean Dolkas of the Human Studies Branch, Biomedical Research Division, where he served as a Guest Worker last summer.

Greg is the President of Baylands 4-H Club where he started a course and is teaching Computer Sciences. He is also Junior Leader of Electricity and Photography Projects. He will pursue his scientific goals at the University of California, Berkeley, next fall.

astrogram

Room 142
Admin. Mgt. Building
Phone 965-5422

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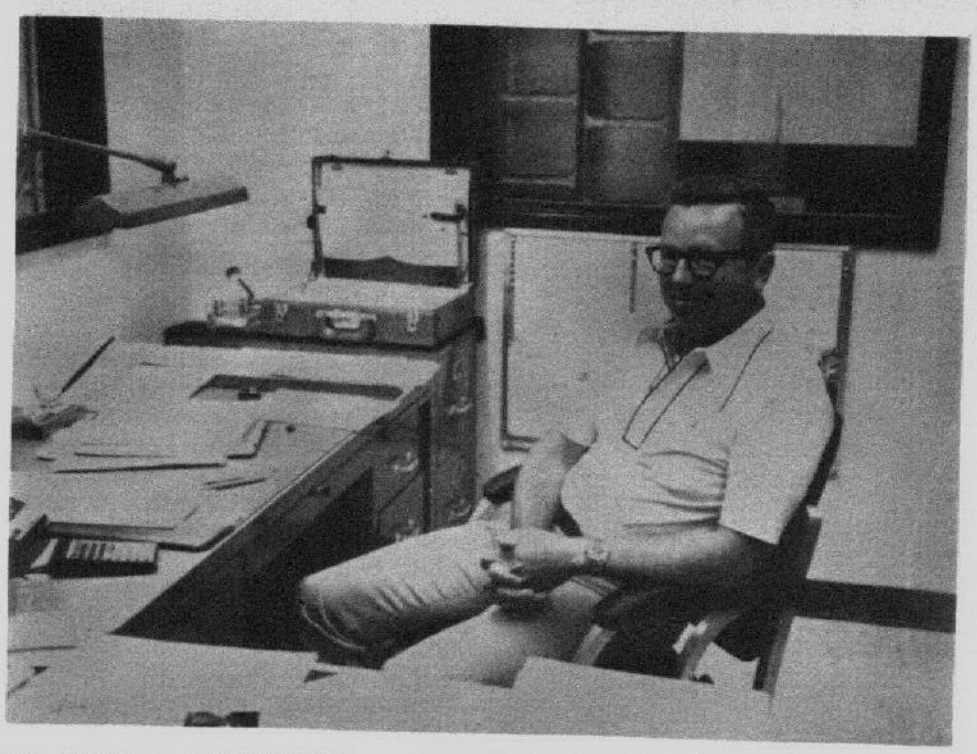
Thursday between publication dates

Scientist Returns From Poland



DR. JOHN E. GREENLEAF . . . recently returned from Warsaw, Poland on an exchange grant from the Polish Academy of Sciences.

(Continued from page 1)

Both Warsaw and the daily laboratory work proved to be quite educational. Dr. Greenleaf found that 75% of the Polish physicians and scientists he worked with were women. They earned approximately $3,000 per year – not because of "sexual discrimination," but rather because a $3,000 per year income is the average annual income of most Polish working men and women no matter what their position.

Housing and consumer product prices are about one-half what they are in the United States. A single girl earning $3,000 annually may pay from $100 to $150 for a 1-room apartment.

Aside from eating Kelloggs corn flakes for breakfast each morning in his typical 1-room apartment, Dr. Greenleaf ate most of his meals out. There are four categories of restaurants to choose from in Warsaw: Deluxe ($8–$10 meal including wine); First Class ($3–$5); Second Class ($1.50–$2); and Third Class (around $1, a Polish sausage and beer stand).

The sausage and beer stands are located on numerous street corners. Dr. Greenleaf reflects, "The Polish sausages and beer are very good as is most of the food I ate in Poland. There was a french fried potato stand next to a sausage and beer stand and it was very frustrating because there were always long lines of people waiting to order so you couldn't possibly eat sausage, french fries and beer together."

"Speaking of lines, in Warsaw there are lines for everything! There are 1,300,000 people living in the City and the majority of them are out – walking, hiking, shopping, eating and socializing – because their apartments are small and not terribly appealing."

There are eleven gas stations in Warsaw which try to accommodate the few people who own cars. Of the 36 people who worked at the Laboratory with Dr. Greenleaf, only three people owned cars.

Old fashioned law and order truly prevails in Poland. There is usually no danger in taking a late night stroll in a large city such as Warsaw. Policemen walk their beat in pairs and the penalty for breaking the law can be severe.

On the whole Poland's economic level is improving. There are more consumer goods available to the populace than there have been in past years. The country is being totally restored though there are still a few scars from World War II.

"The people," says Dr. Greenleaf, "are highly nationalistic, religious, and are of a proud and independent nature. Not all their farms are collective (run by the State) with modern tractors and other mechanized equipment. A horse, plow, man, and woman are often seen tilling the land in the slow and ancient manner. Though many Poles appear to have lost hope for the future, others have an inborn desire to keep striving for a better life."

Ames Seeks Aircraft Proposals

A call for proposals from industry for the lease of a jet transport aircraft for airborne research is being issued by Ames in a move to continue the work of the "Galileo" Convair 990 aircraft lost in the April mid-air collision.

Based on a lease/purchase plan for one year with three annual option periods, the request for proposals centers on an aircraft which, like the "Galileo," will perform scientific missions for Earth and sky viewing with infrared radiometers, microwave radiometers, cameras, telescopes, and other instruments in a wide range of research and Earth resources studies.

The aircraft specifications include the ability to operate and be maintained out of United States and overseas facilities, the ability to carry at least 22,500 kilograms (50,000 pounds) on missions six to eight hours long up to 12,000 meters (40,000 feet) altitude under all weather conditions. The required range is about 6,000 kilometers (3,600 statute miles). The aircraft must also meet standards of airworthiness established for government passenger-carrying aircraft.

While the lease/purchase plan is one method to replace the capabilities of the "Galileo," NASA is also exploring the alternative of obtaining and modifying other government aircraft for the research program. Whatever means finally selected to replace the "Galileo," the aircraft will be operated by Ames as a national scientific facility.

"Bon Voyage" to June Retirees!"

A special "bon voyage" is extended to those fellow employees who recently retired from Ames to take advantage of the summer weather and the chance to indulge in hobbies, travel and leisure. The list is long and some faces who appear on the list may be seen around the Center for a short time in the future because they are returning on a temporary assignment.

Recent June retirees are: Orland J. Alves, FAOE; Edgar W. Banks, RSC; Robert E. Berggren, FQ; Marshall L. Biggs, RFR; Andre T. Bogart, ARI; Howard M. Bragg, RFTE; Hans H. Bresler, AAP; Ray J. Campbell, STG; George E. Cooper, FSO; James W. Cox, RSA; James F. Coyle, SC; J. D. Russell Cravens, RSE; F. Elmar De Boise, AAP; Eugene C. Duncan, RFS; Bradford Evans, AU; William G. Fogleman, RSS; Howard W. Gerdes, APM; Valentine M. Getzi, RSM; Frank L. Goularte, RSM; A. Evelyn Harper, ASP; Merle H. Hartzell, RSC; Milton E. Henderson, RSM; John E. Hilquist, RSM; William E. Houck, RSM; Carlton S. James, D; Nataline F. James, RKS; Eldon W. Kaser, ASD; Melvin S. Koppel, FAOW; Robert M. Kramer, FAOW; Edward J. Lasky, FAOW; Oliver L. Mathison, STE; Howard Matthews, PM; Fred W. Matting, STE; Leroy L. Monroe, RSA; Wilson L. Myers, RSE; Alfred H. Paulsen, ATG; Anselm H. Pepp, ARI; Paul R. Radach, RFR; Charles Sonett, S; Max B. Strauss, RFE; Charles E. Switzer, FAOW; Elizabeth Thomsen, APX; John Van Etten, APS; Lee R. Wiley, RSM; Elsie V. Williams, STE; Clyde F. Wilson, STE.

SUMMER LECTURE SERIES

Upcoming lecturers and topics for "The Natural History of the Earth" series sponsored jointly by NASA–Ames and Stanford University are:

"Formation of the Atmosphere," by Dr. Carl Sagan of Cornell University (July 26) and *"The Diversification of Life,"* by Professor James Valentine of UC, Davis.

The lecture series is free to the general public and is presented on successive Thursday evenings at 8 p.m. in the main auditorium of Building 200 at Ames. Ames employees and visitors can enter Ames by using Gate 18.

For All Who Write Rough Drafts

The following was recommended by a secretary to be brought to the attention of all persons who prepare rough drafts for typing in final form by secretarial/clerical personnel. It appeared in the NASA *"Headquarters Weekly Bulletin."* Heeding the suggestions will result in more effective utilization of manpower resources.

"Much time and frustration and costly human errors can be completely eliminated by simply watching your handwriting. One of the most frustrating things to a secretary is not being able to read the writing of the person for whom she is typing."

"A new secretary, not familiar with technical terms, finds it very difficult to decipher the meaning of the words when the writing is a jumble. Sometimes in the pressure of time deadlines, mistakes can be made which may go undetected in the final typing and can alter the meaning of the entire document."

"Here are some good points to remember:

- Always use a dark pen (black preferably). Also, generally avoid use of felt-tipped pens.
- Use yellow lined paper to submit your draft. It's much easier on the eyes of the typist.
- Make your corrections clear. When you change your wording, be sure the new words and/or sentences are clearly understood. Use arrows and lines to indicate corrections.
- Double space on the paper – it makes it easier to insert corrections.
- Number the pages in consecutive order."

"Remember, you cannot always be there when your secretary is typing your material and you might have a deadline for the paper that she will have to sign out for you and deliver before you return. Save yourself trouble later by taking a few steps now to make your drafts clearly understood."

ANNOUNCEMENT

The National Aeronautics and Space Council, part of the office of the Vice President, was closed on June 30. Material addressed to that office continues to arrive; it is suggested that the office be removed from all mailing lists (including contractors') in order to save handling time and postage costs. THANK YOU.

MISS GENIE NEEL . . . Simulations Experiment Branch accepts a Special Achievement Award for her help in the Convair 990 Accident Investigation Board. Miss Neel "responded with her normal enthusiasm" and in a "thoroughly professional manner." She devoted many evenings to typing, copying and compiling information for the Accident Report. Pictured with Miss Neel are Simulations Experiment Branch Chief George Holden (l.) and Simulation Sciences Division Chief George A. Rathert, Jr.

Speakers Bureau

Late June Appearances:

Three Ames speakers addressed the Western Montana College's summer teacher aerospace workshop via the telelecture conferencing facilities:

•On June 28 Dr. Richard Johnson, Assistant Chief of Planetary Biology Division, talked about Viking; On June 29 Dr. R. T. Jones, Senior Staff Scientist, described the asymmetrical wing concept to the group; and on July 5 Sal Rositano, Electro-Systems Engineering Branch, talked about biomedical instrumentation to the teachers.

Future Presentations:

•On July 26 Dr. Harold P. Klein, Director of Life Sciences, will deliver an evening program for the Lawrence Hall of Science on Skylab.

•On July 26, Frank DeRosa, Contract Administration, will discuss Skylab at the Fellowship Forum in Palo Alto (a group of retired businessmen friends). A number of Ames speakers have talked to the Fellowship Forum in the past.

Another series of three telelectures has been arranged for a state-wide aerospace workshop of teachers sponsored by East Central State College in Ada, Oklahoma.

•On July 16 Tony Cook, Technical Assistant to the Director of Aeronautics and Flight Mechanics, will discuss NASA's research in aeronautics; on July 18 Dr. Sanford Kellman, Theoretical Studies Branch, will deliver a program on astronomy; and on July 24 Dr. Richard Johnson, Assistant Chief of the Planetary Biology Division will describe the Viking program.

"The Next Billion Years"

"The Next Billion Years" lecture series, sponsored in part by Ames, will present free to the general public a lecture entitled *"Designing Resource Conserving Cities"* by Dr. Richard Meier on July 24 at 8 p.m. in Flint Center at DeAnza College.

The following Tuesday (July 31) night lecture will be given by Dr. William E. Cooper on *"Energy and Resources: The Future of Human Society in a Finite World."* The lectures are also presented the evening before the dates listed above in the University of San Francisco Memorial Gymnasium.

The series has been quite successful and all Ames employees are urged to attend the free series. KQED Channel 9 televises each lecture on the Wednesday of the week following the original presentation at 6 p.m.

"Thank You"

"We want to thank our many friends and colleagues for their valued comradship throughout our happy years at Ames. We want especially to thank all of you who made the occasion of our retirement luncheon such a memorable one. We thoroughly enjoyed seeing so many of you, and receiving your good wishes.

Nataline wants to thank everyone for the beautiful silver cordial set with silver tray and crystal decanter. She'll think of you all each time she uses it. Carlton, with the help of the generous gift certificate, is about to acquire another fancy lens for his camera. **Thanks!**

We would like to remind you once again that we are not moving away to the hinterland. We're staying right where we are, in Woodside. So, to turn a phrase, please don't wait for us to call you, *come see us!* Auf Wiedersehen!

Carlton and Nataline James"

ASSE-Ames Seminars

The next two ASEE (American Society for Engineering Education) -NASA Ames Summer Faculty Institute seminar topics are *"Research Frontiers in Holography"* (July 26) and *"Research Applied to National Needs"* (August 2).

The series is presented on successive Thursdays at 4:15 p.m. and can be seen on television at Ames in Building 241, room 145A, or at Stanford University, Skilling Building, room 080 (Auditorium). It will run through August 16 and is open to all Ames employees and all members of the Stanford community.

Golf

An individual low-net tournament was held on July 7 at San Jose Municipal Course. Many members came out to play on a beautiful day. The winners of the three flights as reported by the tournament chairmen Jim Nelan and Sal Tardio were: First Flight: F. Lazzeroni and B. Beam, tied for 1st and 2nd; G. Lazzeroni, 3rd; and S. Hing, 4th. Al Petretti, closest to the pin. Second Flight: K. Souza, 1st; P. Kutler, 2nd; and T. Astalfa and A. Lopez tied for 3rd and 4th. M. Radovich, closest to the pin. Third Flight: E. Mitz, P. Strawbridge and Y. Sheafer tied for 1st; B. Sheafer and T. Nelan tied for 2nd and 3rd; and K. Bruck, 4th. Dona Johnson, closest to the pin.

A rescheduled tournament will be held on July 28 at Oak Ridge; and the next regular tournament on August 11 at Aptos. Anyone interested to play please contact Clark White, ext. 5438.

Bowling

Bowling in the Thursday night league will begin in September at Moonlite Lanes at 6:30 p.m. Anyone interested in joining the league, please call Marilyn Garis, ext. 5605, or Howard Garrison, ext. 6048.

New officers for the 73-74 season are: Howard Garrison, President; Dan Petroff, Vice-President; Allison Ybarra, Treasurer; and Marilyn Garis, Secretary.

Softball

In the last game of the first half schedule, NASA Ames beat the Stonelite Mets 3-1 on a 3-run triple by Roger Hedlung. The win enabled NASA to tie for second place with El Azteca. A playoff game resulted in El Azteca winning by a score of 7-4, mainly on a defensive letdown by the NASA team. The first game of the second halt schedule saw NASA beat Pete Messa by a score of 2-1. Barry Scott hit a run-scoring triple and Bob Bell walked with the bases loaded to account for the winning run.

Civil Defense Alert

One hundred and twenty three sirens from Palo Alto to Gilroy will sound off promptly at 11 a.m., Friday, July 27, as the County Office of Emergency Services conducts a test of the disaster warning devices.

Other sirens in San Mateo County will shatter the morning quiet of their communities at the same time.

The sirens will begin with a one minute steady blast, followed by one minute of silence and then conclude with one minute of the wailing sirens.

The quarterly test is part of the continuing effort by emergency services of the county to keep their equipment in readiness in the event of a major disaster.

The sirens, in an actual emergency situation, would be sounded for three to give minutes. The steady blast denoting an alert – and the wailing siren, or series of short blasts – would signify an attack warning.

Want Ads

Transportation

FOR SALE:
60 Chevy 6. Runs well, inside a little beat. $120. Young 252-2145 after 6.

65 Ford Country Squire Wgn., reduced to $275. Call 738-2972.

66 Ford Wgn., 390 V8, P/S, P/B, radio good mech. cond., $400. D. Wilson 356-8316.

Housing

FOR RENT:
Cabin, So. Lake Tahoe, near casinos & beaches, sleeps 10, $125 per wk., for reservations call 274-4285.

Summer home rental, So. Shore Tahoe, 3 bdrm. 1½ ba., w/w carpets, AEK, sun deck, $150/wk. $75/weekend, 796-9433.

FOR LEASE:
4 bdrm., den, air con., AEK, w/self cleaning oven, Cupertino schools, family of 5 at most, $325, 252-1464.

Miscellaneous

FOR SALE:
Kenmore washer & "like new" Whirlpool elec. dryer, both for $100! 961-1611.

Travel trailer, Shasta 15 ft. sleeps 5, very clean, awning, carpets, dual Butane tanks, $900/offer, 296-2705.

Shotgun, Mossberg, 12 Ga., pump, 28" barrel, mod. choke, $75, 326-7136.

Triple drawer dresser w/night stand, very good cond., $75. 321-1858.

Formica top table, 60 x 40, very good cond., $25. 321-1858.

Attractive old fruitwood buffet, Philippine mahogany end tables; sturdy footlocker, call 325-4182.

WANTED TO PURCHASE:
One or two wheel lightweight trailer, in good cond., reas. priced, 257-0583.

NEED APT. TO SHARE:
Looking for quiet, resp. girl who has 2 bd. furn. apt. willing to share. Pay no more than $100. Call Tina, 327-2146.

RIDE NEEDED:
From Fremont to Ames, Mon.-Fri., call Kirwan 796-9433.

From Homestead High in S'vale area. 8 to 5 (flexible), Ray Mar 738-4101.

From Moss Beach-Half Moon Bay Area, Mon.-Fri., 7:30-4, ext. 5414.

CAR POOL:
Would like to join car pool from Los Altos (Hills) area, call Linda 948-0871.

LOST BOOK:
"Properties of Combustion Gases/ System," from Library, call # TJ 77864, vol. 2, copy 1, return to Library or call Jack Morris.